

DACB
#11

Practitioner's Booklet No. NREL/96-48

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: T. Gessert

Application No.: 0-8 / 937,721 Group No.: 2812

Filed: September 25, 1997 Examiner: S. Mulpuri

For: Ion-Beam Treatment To Prepare Surfaces of P-CdTe Films

Box DAC

Assistant Commissioner for Patents

Washington, D.C. 20231

ATTENTION: Petition Information

Crystal Park One, Suite 520

(M.P.E.P. § 1002.02(b), 7th ed.)

**PETITION FOR REVIVAL OF AN APPLICATION
FOR PATENT ABANDONED UNINTENTIONALLY UNDER
37 C.F.R. § 1.137(b)**

1. This application became abandoned on 11/19/99

CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. § 1.9(a))

I hereby certify that this correspondence is, on the date shown below, being:

MAILING

☐ deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

FACSIMILE

☐ transmitted by facsimile to the Patent and Trademark Office.

Signature

Date: _____

(Type or print name of person certifying)

12/22/1999 SLURNG1 00000084 08937721

01 FC:241

605.00 0P

2. This application became abandoned because the failure to prosecute was an unintentional delay. The entire delay in filing the required reply from the due date until the filing of this petition was unintentional 37 C.F.R. § 1.137(b)(3), as detailed hereafter.

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**FACTS IN SUPPORT OF
UNINTENTIONAL DELAY**

A) On May 4, 1999, applicant's representative telephoned Examiner Mulpuri and faxed a Proposed Amendment (Exhibit I) under 37 C.F.R. § 1.116 for consideration prior to an interview in preparation for submitting an actual amendment under 37 C.F.R. § 1.116 (see attached Exhibit I).

B) Applicant's representative repeatedly telephoned Examiner Mulpuri, (whose telephone did not take recordation then or now) for 3 ½ months. After telephoning the group receptionist, Examiner Mulpuri ultimately telephoned me on August 17, 1999 regarding the May 4, 1999 Proposed Amendment.

C) Examiner Mulpuri indicated that the amendment should be revised to clearly identify up-front, the three principle issues or problems solved by the invention process by virtue of preparing a low-resistance electrical contact between a metal and a polycrystalline t-CdTe surface (which is very difficult if not impossible to uniformly reproduce after typical prior art wet etching treatment processes). None of the references either singularly or collectively disclose this concept.

D) On August 17, 1999 amendment under 37 C.F.R. § 1.116 with a three month extension (Exhibit II) was filed (which was more than five months after the initial rejection of March 15, 1999).

E) Long after the six month period from the mailing date of the Final Rejection (after 9/15/99) Examiner Mulpuri mailed an ADVISORY ACTION on 10/7/99 (Exhibit III) (received by client, NREL on 10/12/99) indicating that the amendment under 37 C.F.R. § 1.116 was one whose "ARGUMENTS ARE CONVINCING"; however, no disposition was checked off on the ADVISORY ACTION regarding whether the amendment under 37 C.F.R. § 1.116 would be entered or not--although there was an attachment with explanations that conflicted with Examiner Mulpuri's determination that applicant's "ARGUMENTS ARE CONVINCING".

F) Client, NREL, faxed me the contradictory ADVISORY ACTION and requested me to contact Examiner Mulpuri for an explanation regarding same. Still unable to contact Examiner Mulpuri due to her improperly working telephone, I went over to the Patent Office on 10/28/99 and had an interview regarding her indication that the arguments in the amendment after Final Rejection were convincing yet she did not indicate the status of the amendment in any of the 7 boxes provided on the ADVISORY ACTION form, and that the client, NREL, was concerned because someone called from the abandonment section to know whether the case was abandoned.

G) During the interview, Examiner Mulpuri indicated that she would send a Supplemental ADVISORY ACTION correcting the previously submitted ADVISORY ACTION containing contradictory statements and properly check-off the boxes pertaining to disposition after considering the amendment, and that I could file a Continued Prosecution Application the next day (10/29/99) before such time as a NOTICE OF ABANDONMENT was sent out on the parent application.

H) On November 18, 1999 a NOTICE OF ABANDONMENT (Exhibit IV) was mailed to client, NREL, in which Examiner Mulpuri reversed her position by indicating that she would not issue a Supplemental ADVISORY ACTION and that a Continued Prosecution Application could not be processed because no timely response to the ADVISORY ACTION of 10/7/99 (which was mailed after the 9/15/99 sixth month period after the Final Rejection notice) was made. However, no timely reply could be made as Examiner Mulpuri mailed the ADVISORY ACTION after the sixth month period of 9/15/99 or on 10/7/99.

I) Mean while, consistent with the agreement reached with Examiner Mulpuri on 10/28/99, I filed a Continued Prosecution Application with a Preliminary Amendment (Exhibit V) in the PTO on 10/29/99 and hand-delivered a copy of the CPA (as promised) to Examiner Mulpuri's office.

3. Response or action required

- ☒ has been filed.
- ☒ is attached.

- ☒ The response is the filing of a continuation application having an express abandonment conditioned on the granting of a filing date to the continuing application copending with this application.

4. Fee (37 C.F.R. 1.17(m))

Application status is:

- ☒ Small business entity—fee \$605.00
☐ A statement is attached.
☒ A statement was filed.
☐ Other than small entity—fee \$1,210.00

5. Payment of fee

- ☒ Enclosed please find check for ☒ \$605.00. ☐ \$1,210.00.
☐ Charge Account _____ for any additional fee required.
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Date: 12/21/99

Jerome J. Norris

Signature of person making statement
that abandonment was due to an unintentional delay

JEROME J. NORRIS

(type or print name of person making statement)

1901 Pennsylvania Ave., N.W. #305

Residence of person making statement

Washington, DC 20006

Reg. No.: 24,696

Tel. No.: (202) 737-4410

Customer No.:

Jerome J. Norris

SIGNATURE OF PRACTITIONER

JEROME J. NORRIS

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P.O. Address

Washington, D.C. 20006

Practitioner's Docket No. NREL/96-48

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EXHIBIT I

LAW OFFICES OF JEROME J. NORRIS
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WASHINGTON, D.C. 20006 U.S.A.



Jerome J. Norris*

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Anthony D. Miller**

E-Mail: jnorrislaw@erols.com

Sam Shipkowitz (Ph.D E.E.)

* admitted NY only

** admitted PA only

FACSIMILE TRANSMISSION COVER SHEET

DATE: May 4, 1999

TO:

Fax No.: (703) 305-3432

Company: USPTO (Group 2800)

Name : Examiner S. Mulpuri

FROM:

Fax No.: 202-737-3315

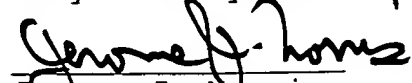
Name: Jerome J. Norris

TOTAL NUMBER OF SHEETS INCLUDING THIS PAGE: 10

Dear Examiner Mulpuri:

I telephoned today to request that, upon receipt of this proposed amendment, a telephone interview be scheduled to discuss the merits of this application in view of the proposed amendments to the claims.

Very truly yours,


Jerome J. Norris

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY.'S DOCKET: NREL/96-48

Applicant: Timothy A. Gessert)
Serial No.: 08/937,721) Group Art: 1741
Filing Date: September 25, 1997) Examiner: S. Mulpuri
Title: ION-BEAM TREATMENT TO)
PREPARE SURFACES OF)
P-CdTe FILMS)

PROPOSED AMENDMENT UNDER 37 CFR §1.116

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In reply to the Official Action of March 15, 1999, rejecting the claims in the above-identified patent application, applicant respectfully request reconsideration, based upon the amendments hereinafter set forth.

IN THE CLAIMS

1. (Twice Amended) A dry process for making a low-resistance electrical contact between a metal and a layer of p-type CdTe

surface by ion beam processing comprising:

- a) placing a Cds/CdTe device into a chamber and evacuating said chamber to create a vacuum;
- b) orientating the p-CdTe side of the CdS/CdTe device to face apparatus capable of generating Ar atoms and ions of preferred energy and directionality;
- c) introducing Argon and igniting the area of apparatus to generate Ar atoms and ions of preferred energy and directionality in a manner so that during ion exposure, the source-to-substrate distance is maintained such that it is less than the mean-free path or diffusion length of the Ar atoms and ions at the vacuum pressure; and
- d) allowing exposure of the p-CdTe side of the layer to said ion beam for a period less than about 5 minutes[.] prior to forming a contact interface or semiconductor layer.

REMARKS

The Official Action and the cited references have again been carefully reviewed. The review indicates that the claims, as amended, recite patentable subject matter and should be allowed. Reconsideration and allowance are therefore respectfully requested.

Prior to contending with the grounds upon which the rejections are based, it is useful to summarize the essentials of the invention "dry process" for providing a uniform and reproduceable surface of low-resistance electrical contact between a metal and a layer of p-type CdTe surface of a semiconductor device by an argon beam of Ar atoms prior to forming a contact interface or additional semiconductor layer.

Applicant is the first to invent a "dry process" for making a uniform and reproduceable surface of low-resistance electrical contact between a metal and a layer of p-type CdTe surface through the use of a unique form of Ar ion beam processing prior to forming a contact interface or additional semiconductor layer.

The invention process is accomplished by:

a) placing a CdS/CdTe device into a chamber and evacuating the chamber to create a vacuum;

b) orientating the p-CdTe side of the CdS/CdTe device to face apparatus capable of generating Ar atoms and ions of preferred energy and directionality;

c) introducing Argon and igniting the area of apparatus to generate Ar atoms and ions of preferred energy and directionality in a manner so that during ion exposure, the source-to-substrate distance is maintained such that it is less than the mean-free path or diffusion length of the Ar atoms and ions at the vacuum pressure; and

d) allowing exposure of the p-CdTe side of the layer to the ion beam for a period less than about 5 minutes prior to forming a contact interface or additional semiconductor layer.

Claims 1-2 and 4 were rejected as being unpatentable over admitted prior art in combination with Schroen et al. under 35 U.S.C. §103(a).

Applicant respectfully traverses the rejection and requests reconsideration for the following reasons.

While the "admitted prior art" on pages 5 and 6 of applicant's specification disclose methods of making CdS/CdTe devices, these processes clearly lack teaching a "dry process" for providing a uniform and reproduceable surface of low-resistance electrical contact between a metal and a layer of p-type CdTe surface of a semiconductor, let alone suggesting, teaching or disclosing exposing the p-type CdTe to Ar ions or atoms prior to forming an additional contact interface or semiconductor layer to reduce contact resistance.

The deficiencies of these "admitted prior art" references are not compensated for by any teachings or disclosure in the secondary reference of Schroen et al.

Schroen et al. is directed to a process for fabrication of a semiconductor ohmic contact structure comprising:

- a. exposing a selected portion of a semiconductor body to a glow discharge in the presence of an inert gas;

b. exposing the selected portion to a glow discharge in oxygen or nitrogen, at conditions selected to form an adherent uniform film of nonconductor 10-100 Angstroms thick on the selected portion of the semiconductor body; and

c. forming an adherent film of conductor on the nonconductor film, to complete a contact structure having linear I-V characteristics.

The Schroen et al. patent deals with crystalline Si, and not a polycrystalline CdTe (which is a II-VI material).

Further, the only specific material on which the process of Schroen et al. has been demonstrated is crystalline Si. However, Si forms a stable oxide and this oxide is non-reactive with most metals.

Significantly, Schroen et al. discloses the use of a "glow discharge in the presence of an inert gas" specifically to activate the Si surface for a subsequent formation of "an adherent uniform film of non conductor".

By contrast, applicant's invention is directed to use of an ion-beam process to condition a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer.

Consequently, the invention process is not conditioning the surface to facilitate formation of a non conductor - but rather a semiconductor.

Moreover, the ion dynamics and the plasma chemistry occurring in the surface of the clean crystalline Si, and caused by exposure to a 1-10keV glow discharge of Schroen et al., which is high-voltage, high-pressure is vastly different from the 0.05-2keV ion-beam exposure (low-voltage, low-pressure) of the CdCl₂-treated polycrystalline p-CdTe of the invention process.

The improvement in the interfacial current transport at the p-CdTe interface of the invention is by improved alignment of the valence bands between semiconductors. By contrast, the improvement in current transport of the Si/oxide/metal interface of Schroen et al. is by the creation of "a semiconductor-insulator interface with suitable electrical properties to create an accumulation in the adjacent semiconductor."

Thus, even if the "accumulation layer" would improve quantum-mechanical tunneling between a semiconductor and a metal, it nevertheless represents very different physics of interfacial current transport, and the process used to provide optimal "activation" of a Si surface is drastically different than the invention process which is used to prepare the surface of a p-CdTe film.

Therefore, the combination of Schroen et al. with "admitted prior art" cannot be reconciled under the provisions of 35 U.S.C. §103 for purposes of rendering claims 1-2 and 4, especially as amended, obvious.

Withdrawal of the rejection is respectfully requested.

Claim 5 has been rejected as being unpatentable over "admitted prior art" in combination with Schroen et al., further in view of Lee et al. under 35 U.S.C. §103(a).

Applicant respectfully traverses the rejection and requests reconsideration for the following reasons.

The "admitted prior art" and Schroen et al. have already been discussed above.

The collective deficiencies in the "admitted prior art" and Schroen et al. are not compensated for in the teachings of the Lee et al. reference.

This is so because Lee et al. is directed to an external plasma gun that provides both ions and electrons for bombarding substrates. There is no reference to or acknowledgement of the use of this external plasma gun to condition a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer. Therefore, the fact that an exit aperture having a diameter of 3cm is disclosed would provide no incentive for or reason why one skilled in the art would be led to utilize this external plasma gun with an aperture of 3cm in one of its specific embodiments for use as an ion-beam in combination with Schroen et al. and the "admitted prior art" to condition a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer.

Withdrawal of the rejection is respectfully requested.

Claim 6 was rejected as being unpatentable over "admitted prior art" in combination with Schroen et al., further in view of Ebe et al., under 35 U.S.C. §103(a).

Applicant respectfully traverses the rejection and requests reconsideration for the reasons hereinafter explained.

All of the "admitted prior art" and Schroen et al. have been discussed supra.

Ebe et al. is directed to a method for manufacturing film carrier type substrates in a vacuum by depositing a metal vapor on a film made of organic high molecular substance and irradiating accelerated nitrogen gas ions on the film simultaneously with the step of depositing metal vapor.

Ebe et al.'s teachings clearly are non-related to those of the "admitted prior art" and Schroen et al. for the reason that Ebe et al. is directed to providing a carrier type substrate that includes the film of organic high molecular weight substance and a metal formed thereon to effect high density mounting of integrated circuits to obtain super-adhesive characteristics. Therefore, there would be no incentive or reason why one skilled in the art of making CdS/CdTe devices by conditioning a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer by looking to the art of obtaining super adhesion between an organic high molecular weight substance

and a metal layer formed thereover and an appropriate exposure angle of an ion beam source for making a uniform and reproduceable surface of a low-resistance electrical contact between a metal and a layer of p-type CdTe surface.

Thus, the combination of "admitted prior art" with Schroen et al. and Ebe et al. cannot be reconciled under the auspices under 35 U.S.C. §103 for rejecting claim 6 as presently recited.

In view of the foregoing amendments, remarks and arguments, it is believed that the application is now in condition for allowance, and early notification of the same is earnestly solicited.

Respectfully submitted,

Jerome J. Norris
Attorney for Applicant
Registration No. 24,696

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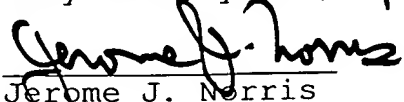
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The improvement in the interfacial current transport at the p-CdTe interface of the invention is by improved alignment of the valence bands between semiconductors. By contrast, the improvement in current transport of the Si/oxide/metal interface of Schroen et al. is by the creation of "a semiconductor-insulator interface with suitable electrical properties to create an accumulation in the adjacent semiconductor."

Thus, even if the "accumulation layer" would improve quantum-mechanical tunneling between a semiconductor and a metal, it nevertheless represents very different physics of interfacial current transport, and the process used to provide optimal "activation" of a Si surface is drastically different than the invention process which is used to prepare the surface of a p-CdTe film.

Therefore, the combination of Schroen et al. with "admitted prior art" cannot be reconciled under the provisions of 35 U.S.C. §103 for purposes of rendering claims 1-2 and 4, especially as amended, obvious.

Withdrawal of the rejection is respectfully requested.

Claim 5 has been rejected as being unpatentable over "admitted prior art" in combination with Schroen et al., further in view of Lee et al. under 35 U.S.C. §103(a).

Applicant respectfully traverses the rejection and requests reconsideration for the following reasons.

The "admitted prior art" and Schroen et al. have already been discussed above.

The collective deficiencies in the "admitted prior art" and Schroen et al. are not compensated for in the teachings of the Lee et al. reference.

This is so because Lee et al. is directed to an external plasma gun that provides both ions and electrons for bombarding substrates. There is no reference to or acknowledgement of the use of this external plasma gun to condition a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer. Therefore, the fact that an exit aperture having a diameter of 3cm is disclosed would provide no incentive for or reason why one skilled in the art would be led to utilize this external plasma gun with an aperture of 3cm in one of its specific embodiments for use as an ion-beam in combination with Schroen et al. and the "admitted prior art" to condition a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer.

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Ebe et al. is directed to a method for manufacturing film carrier type substrates in a vacuum by depositing a metal vapor on a film made of organic high molecular substance and irradiating accelerated nitrogen gas ions on the film simultaneously with the step of depositing metal vapor.

Ebe et al.'s teachings clearly are non-related to those of the "admitted prior art" and Schroen et al. for the reason that Ebe et al. is directed to providing a carrier type substrate that includes the film of organic high molecular weight substance and a metal formed thereon to effect high density mounting of integrated circuits to obtain super-adhesive characteristics. Therefore, there would be no incentive or reason why one skilled in the art of making CdS/CdTe devices by conditioning a polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer by looking to the art of obtaining super adhesion between an organic high molecular weight substance

and a metal layer formed thereover and an appropriate exposure angle of an ion beam source for making a uniform and reproduceable surface of a low-resistance electrical contact between a metal and a layer of p-type CdTe surface.

Thus, the combination of "admitted prior art" with Schroen et al. and Ebe et al. cannot be reconciled under the auspices under 35 U.S.C. §103 for rejecting claim 6 as presently recited.

In view of the foregoing amendments, remarks and arguments, it is believed that the application is now in condition for allowance, and early notification of the same is earnestly solicited.

Respectfully submitted,

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EXHIBIT II

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ARTY.'S DOCKET: NREL/96-48

Applicant:	Timothy A. Gessert)	
)	
)	Group Art: 1741
Serial No.:	08/937,721)	Examiner: S. Mulpuri
)	
Filing Date:	September 25, 1997)	
)	
Title:	ION-BEAM TREATMENT TO)	
	PREPARE SURFACES OF)	
	P-CdTe FILMS)	

AMENDMENT UNDER 37 CFR §1.116

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In reply to the Official Action of March 15, 1999, rejecting the claims in the above-identified patent application, applicant respectfully request reconsideration, based upon the amendments hereinafter set forth.

A three month extension is requested, and the fee therefore in the amount of \$870.00 is enclosed herewith.

IN THE CLAIMS

1. (Twice Amended) A dry process for making a low-resistance electrical contact between a metal and a layer of polycrystalline p-type CdTe surface by ion beam processing comprising:

a) placing a CdS/CdTe device having a polycrystalline p-type CdTe into a chamber and evacuating said chamber to create a vacuum;

b) orientating the polycrystalline p-CdTe side of the CdS/CdTe device to face apparatus capable of generating Ar atoms and ions of preferred energy and directionality;

c) introducing Argon and igniting the area of apparatus to generate Ar atoms and ions of preferred energy and directionality in a manner so that during ion exposure, the source-to-substrate distance is maintained such that it is less than the mean-free path or diffusion length of the Ar atoms and ions at the vacuum pressure; and

d) allowing exposure of the polycrystalline p-CdTe side of the layer to said ion beam for a period less than about 5 minutes[.] prior to forming a contact interface or semiconductor layer.

REMARKS

Applicant's attorney acknowledges with appreciation, the courtesy extended by Examiner Mulpuri in granting the discussions

based upon the proposed amendment and to hear applicant's representative's indication that there are basically three principle issues or problems which the invention's dry process solves.

As promised to Examiner Mulpuri, the three principle issues or problems are as follows:

1) it is especially difficult in the case of polycrystalline p-type CdTe surfaces to make low-resistance electrical contacts with a metal because of the inability of the polycrystalline p-type CdTe to sustain sufficiently high p-type carrier concentration to enable quantum-mechanical tunneling of charged carriers at the CdTe/metal contact interface (see page 4, lines 8-24);

2) the polycrystalline p-type CdTe material used as the absorber in a CdS/CdTe photovoltaic device physically treated with Cl-containing liquids prior to formation of ohmic contact at the CdTe surface is rich in Cl and this coupled with the fact that the formation of oxide layers from atmospheric oxygen alters the chemical properties of the polycrystalline p-type CdTe surfaces of the electrical transport at the contact interface (which in turn alters the characteristics of the ohmic contact) necessitates removal of the contaminated surfaces by wet chemical treatments; and

3) these wet chemical treatments make it difficult to control uniformity and reproducibility of the ohmic contact (see page 11,

lines 9-20).

Since the dry process identified in the invention process predominately affects only the surfaces of polycrystalline CdTe, the disadvantageous grain-boundary etching of the polycrystalline CdTe shown in FIG. 7b is avoided as a result of using the dry process of the present invention (see paragraph bridging pages 11 and 12 of the specification).

It is believed that these discussions have materially advanced the prosecution of this application.

The Official Action and the cited references have again been carefully reviewed. The review indicates that the claims, especially as amended, recite patentable subject matter and should be allowed. Reconsideration and allowance are therefore respectfully requested.

Prior to contending with the grounds upon which the rejections are based, it is useful to summarize the essentials of the invention "dry process" for providing uniform and reproducible low-resistance electrical contacts (page 15, lines 15-19) between a metal and a layer of polycrystalline p-type CdTe surface of a semiconductor device by an argon beam of Ar atoms prior to forming a contact interface or additional semiconductor layer.

Applicant is the first to invent a "dry process" for making a uniform and reproducible surface of low-resistance electrical contact between a metal and a layer of polycrystalline p-type CdTe

surface through the use of a unique form of Ar ion beam processing prior to forming a contact interface or additional semiconductor layer.

The invention process is accomplished by:

- a) placing a CDs/CdTe device having a polycrystalline p-type CdTe into a chamber and evacuating the chamber to create a vacuum;
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Claims 1-2 and 4 were rejected as being unpatentable over admitted prior art in combination with Schroen et al. under 35 U.S.C. §103(a).

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applicant's specification disclose methods of making CdS/CdTe devices, these processes clearly lack teaching a "dry process" for providing a uniform and reproducible surface of low-resistance electrical contact between a metal and a layer of polycrystalline p-type CdTe surface of a semiconductor, let alone suggesting, teaching or disclosing exposing a polycrystalline p-type CdTe to Ar ions or atoms prior to forming an additional contact interface or semiconductor layer to reduce contact resistance.

The deficiencies of these "admitted prior art" references are not compensated for by any teachings or disclosure in the secondary reference of Schroen et al.

Schroen et al. is directed to a process for fabrication of a semiconductor ohmic contact structure comprising:

- a. exposing a selected portion of a semiconductor body to a glow discharge in the presence of an inert gas;
- b. exposing the selected portion to a glow discharge in oxygen or nitrogen, at conditions selected to form an adherent uniform film of nonconductor 10-100 Angstroms thick on the selected portion of the semiconductor body; and
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The Schroen et al. patent deals with crystalline Si, and not a polycrystalline CdTe.

Further, the only specific material on which the process of Schroen et al. has been demonstrated is crystalline Si. However, Si forms a stable oxide and this oxide is non-reactive with most metals.

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Thus, even if the "accumulation layer" would improve quantum-mechanical tunneling between a semiconductor and a metal, it nevertheless represents very different physics of interfacial current transport, and the process used to provide optimal "activation" of a Si surface is drastically different than the invention process which is used to prepare the surface of a polycrystalline p-CdTe film.

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EXHIBIT II

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ARTY.'S DOCKET: NREL/96-48

Applicant: Timothy A. Gessert)
Serial No.: 08/937,721) Group Art: 1741
Filing Date: September 25, 1997) Examiner: S. Mulpuri
Title: ION-BEAM TREATMENT TO)
PREPARE SURFACES OF)
P-CdTe FILMS)



AMENDMENT UNDER 37 CFR §1.116

Honorable Commissioner of Patents and Trademarks
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Sir:

In reply to the Official Action of March 15, 1999, rejecting the claims in the above-identified patent application, applicant respectfully request reconsideration, based upon the amendments hereinafter set forth.

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REMARKS

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2) the polycrystalline p-type CdTe material used as the absorber in a CdS/CdTe photovoltaic device physically treated with Cl-containing liquids prior to formation of ohmic contact at the CdTe surface is rich in Cl and this coupled with the fact that the formation of oxide layers from atmospheric oxygen alters the chemical properties of the polycrystalline p-type CdTe surfaces of the electrical transport at the contact interface (which in turn alters the characteristics of the ohmic contact) necessitates removal of the contaminated surfaces by wet chemical treatments; and

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Since the dry process identified in the invention process predominately affects only the surfaces of polycrystalline CdTe, the disadvantageous grain-boundary etching of the polycrystalline CdTe shown in FIG. 7b is avoided as a result of using the dry process of the present invention (see paragraph bridging pages 11 and 12 of the specification).

It is believed that these discussions have materially advanced the prosecution of this application.

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In view of the foregoing amendments, remarks and arguments, it is believed that the application is now in condition for allowance, and early notification of the same is earnestly solicited.

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Advisory Action

Application No.

08/937,721

Applicant(s)

Gessert

Examiner

S. Mulpuri

Group Art Unit

2812

THE PERIOD FOR RESPONSE: [check only a) or b)]a) ☒ expires 6 months from the mailing date of the final rejection.b) ☐ expires either three months from the mailing date of the final rejection, or on the mailing date of this Advisory Action, whichever is later. In no event, however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition, and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☐ Appellant's Brief is due two months from the date of the Notice of Appeal filed on _____ (or within any period for response set forth above, whichever is later). See 37 CFR 1.191(d) and 37 CFR 1.192(a).

Applicant's response to the final rejection, filed on 8/23/99 has been considered with the following effect, but is NOT deemed to place the application in condition for allowance:

☐ The proposed amendment(s):

☐ will be entered upon filing of a Notice of Appeal and an Appeal Brief.

☐ will not be entered because:

☐ they raise new issues that would require further consideration and/or search. (See note below).

☐ they raise the issue of new matter. (See note below).

☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

☐ they present additional claims without cancelling a corresponding number of finally rejected claims.

NOTE: _____

☐ Applicant's response has overcome the following rejection(s): _____

☐ Newly proposed or amended claims _____ would be allowable if submitted in a separate, timely filed amendment cancelling the non-allowable claims.

☒ The affidavit, exhibit or request for reconsideration has been considered but does NOT place the application in condition for allowance because:

ARGUMENTS ARE CONVINCING.

☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.

☒ For purposes of Appeal, the status of the claims is as follows (see attached written explanation, if any):

Claims allowed: NONE

Claims objected to: NONE

Claims rejected: 1-2, 4-6

☐ The proposed drawing correction filed on _____ ☐ has ☐ has not been approved by the Examiner.

☐ Note the attached Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☒ Other SEE THE ATTACHMENT

Attachment to the advisory action

Applicant amended the claims to limit p-type CdTe surface and dry etching technique. However, admitted Prior Art discloses forming solar cells from single crystalline materials, amorphous material or polycrystalline materials(see page 3, lines 1-9, page 12-20) and wet etching and dry etching (see page 6, lines 6-14).

Applicant argues that admitted prior art does not disclose a dry "etch process" for providing a uniform and reproducible surface of low-resistance electrical contact between metal layer and a layer polycrystalline p-type CdTe prior to additional contact interface or semiconductor layer to reduce contact resistance. However, modified invention of admitted prior art, as modified by the teachings of Schroen et al for Ar irradiation, Lee et al for aperture of 3 nm diameter and Ebe et al for angular irradiating of Ar on the target.

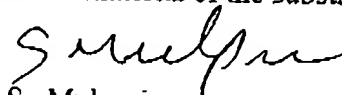
Admitted art teaches of forming solar cell metallization on II-VI semiconductor compound, could be p-type CdTe layer. Schroen et al et al is simply relied on Ar irradiation on surface p-type CdTe. It is agreed with applicant Schroen et al exemplifies the process with Si. However, Schroen et al clearly mention inventive concept of irradiation includes II-VI compounds.

Applicant argues that Schroen et al uses high voltage 1-10 keV which includes recite voltages.

It is agreed that Schroen et al grows silicon oxide, minimum of 10 angstroms, prior to metal formation. However, Schroen et al obtains synergistic advantage by both Ar irradiation and silicon oxide as well for reducing the contact resistance. However, Admitted prior art, as modified by Schroen et al, would completes, subsequent to irradiation of Ar, the structure forming metal on p-type CdTe.

Applicant argues that Lee et al uses external plasma gun and no reference to condition polycrystalline p-CdTe surface prior to deposition of an additional semiconductor layer. However, Lee et al is relied on the teaching of plasma apparatus with aperture diameter of 3 cm for bombarding Ar ions on substrate for effective Ar irradiation. It does not matter whether Lee et al uses glow discharge in the presence of inert gas, or forming oxide instead of metal or semiconductor layer, which are irrespective claimed language.

Applicant argues that teachings of Ebe et al is nonrelavent to the instant invention. However, the purpose of the Schroen et al and Abe et al is to reduce contaminants by using Ar irradiation. It does not matter whether the substrate is semiconductor or other, angle implantation of Ar is preferred, when taken the efficiency of sputtering into account Ebe et al further teach angle depends on the kind of inert ions and material of the substrate.



S. Mulpuri

Patent examiner

Technology Center 2800

Advisory Action

Application No.

08/937,721

Applicant(s)

Gessert

Examiner

S. Mulpuri

Group Art Unit

2812

THE PERIOD FOR RESPONSE: (check only a) or b)a) ☒ expires 6 months from the mailing date of the final rejection.b) ☐ expires either three months from the mailing date of the final rejection, or on the mailing date of this Advisory Action, whichever is later. In no event, however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition, and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☐ Appellant's Brief is due two months from the date of the Notice of Appeal filed on _____ (or within any period for response set forth above, whichever is later). See 37 CFR 1.191(d) and 37 CFR 1.192(a).

Applicant's response to the final rejection, filed on 8/23/99 has been considered with the following effect, but is NOT deemed to place the application in condition for allowance:

☐ The proposed amendment(s):

☐ will be entered upon filing of a Notice of Appeal and an Appeal Brief.

☐ will not be entered because:

☐ they raise new issues that would require further consideration and/or search. (See note below).

☐ they raise the issue of new matter. (See note below).

☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

☐ they present additional claims without cancelling a corresponding number of finally rejected claims.

NOTE:

☐ Applicant's response has overcome the following rejection(s):

☐ Newly proposed or amended claims _____ would be allowable if submitted in a separate, timely filed amendment cancelling the non-allowable claims.

☒ The affidavit, exhibit or request for reconsideration has been considered but does NOT place the application in condition for allowance because:

ARGUMENTS ARE CONVINCING.

☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.

☒ For purposes of Appeal, the status of the claims is as follows (see attached written explanation, if any):

Claims allowed: NONE

Claims objected to: NONE

Claims rejected: 1-2, 4-6

☐ The proposed drawing correction filed on _____ ☐ has ☐ has not been approved by the Examiner.

☐ Note the attached Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☒ Other SEE THE ATTACHMENT

Attachment to the advisory action

Applicant amended the claims to limit p-type CdTe surface and dry etching technique. However, admitted Prior Art discloses forming solar cells from single crystalline materials, amorphous material or polycrystalline materials (see page 3, lines 1-9, page 12-20) and wet etching and dry etching (see page 6, lines 6-14).

Applicant argues that admitted prior art does not disclose a dry "etch process" for providing a uniform and reproducible surface of low-resistance electrical contact between metal layer and a layer polycrystalline p-type CdTe prior to additional contact interface or semiconductor layer to reduce contact resistance. However, modified invention of admitted prior art, as modified by the teachings of Schroen et al for Ar irradiation, Lee et al for aperture of 3 nm diameter and Ebe et al for angular irradiating of Ar on the target.

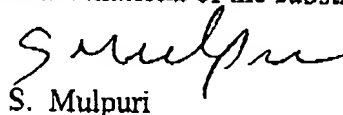
Admitted art teaches of forming solar cell metallization on II-VI semiconductor compound, could be p-type CdTe layer. Schroen et al et al is simply relied on Ar irradiation on surface p-type CdTe. It is agreed with applicant Schroen et al exemplifies the process with Si. However, Schroen et al clearly mention inventive concept of irradiation includes II-VI compounds.

Applicant argues that Schroen et al uses high voltage 1-10 keV which includes recite voltages.

It is agreed that Schroen et al grows silicon oxide, minimum of 10 angstroms, prior to metal formation. However, Schroen et al obtains synergistic advantage by both Ar irradiation and silicon oxide as well for reducing the contact resistance. However, Admitted prior art, as modified by Schroen et al, would complete, subsequent to irradiation of Ar, the structure forming metal on p-type CdTe.

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S. Mulpuri

Patent examiner

Technology Center 2800

Notice of AbandonmentApplication No.
08/937,721

Applicant(s)

Gessert

Examiner

S. Mulpuri

Group Art Unit

2812

This application is abandoned in view of:

- ☐ applicant's failure to timely file a proper response to the Office letter mailed on _____.
- ☐ A response (with a Certificate of Mailing or Transmission of _____) was received on _____, which is after the expiration of the period for response (including a total extension of time of _____ month(s)) which expired on _____.
- ☐ A proposed response was received on _____, but it does not constitute a proper response to the final rejection.
(A proper response to a final rejection consists only of: a timely filed amendment which places the application in condition for allowance; a Notice of Appeal; or the filing of a continuing application under 37 CFR 1.62 (FWC)).
- ☐ No response has been received.
- ☐ applicant's failure to timely pay the required issue fee within the statutory period of three months from the mailing date of the Notice of Allowance.
- ☐ The issue fee (with a Certificate of Mailing or Transmission of _____) was received on _____.
- ☐ The submitted issue fee of \$ _____ is insufficient. The issue fee required by 37 CFR 1.18 is \$ _____.
- ☐ The issue fee has not been received.
- ☐ applicant's failure to timely file new formal drawings as required in the Notice of Allowability.
- ☐ Proposed new formal drawings (with a Certificate of Mailing or Transmission of _____) were received on _____.
- ☐ The proposed new formal drawings filed _____ are not acceptable.
- ☐ No proposed new formal drawings have been received.
- ☐ the express abandonment under 37 CFR 1.62(g) in favor of the FWC application filed on _____.
- ☐ the letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
- ☐ the letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
- ☐ the decision by the Board of Patent Appeals and Interferences rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
- ☒ the reason(s) below:
Supplemental advisory action is not effective, and CPA can not be processed because applicant did not timely respond to advisory action 10/7/99.

S. Mulpuri
11/18/99

Notice of Abandonment

Application No.

08/937,721

Applicant(s)

Gessert

Examiner

S. Mulpuri

Group Art Unit

2812

This application is abandoned in view of:

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- ☐ A response (with a Certificate of Mailing or Transmission of _____) was received on _____, which is after the expiration of the period for response (including a total extension of time of _____ month(s)) which expired on _____.
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X the reason(s) below:

Supplemental advisory action is not effective, and CPA can not be processed because applicant did not timely respond to advisory action 10/7/99.

S. Mulpuri
11/18/99

EXHIBIT V

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ARTY.'S DOCKET: NREL/96-48

Applicant: Timothy A. Gessert)
Serial No.: 08/937,721) Group Art: 1741
Filing Date: September 25, 1997) Examiner: S. Mulpuri
Title: ION-BEAM TREATMENT TO)
PREPARE SURFACES OF)
P-CdTe FILMS)

PRELIMINARY AMENDMENT

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In advance of prosecution, and before this application is taken up for examination on the merits, please amend the application as follows:

IN THE CLAIMS

1. (Twice Amended) A dry process for making a low-resistance electrical contact between a metal and a layer of polycrystalline p-type CdTe surface by ion beam processing comprising:

a) placing a CdS/CdTe device having a polycrystalline p-type CdTe into a chamber and evacuating said chamber to create a vacuum;

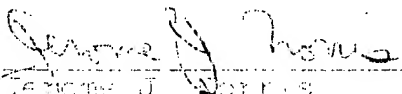
b) orientating the polycrystalline p-CdTe side of the CdS/CdTe device to face apparatus capable of generating Ar atoms

and ions of preferred energy and directionality;

c) introducing Argon and igniting the area of apparatus to generate Ar atoms and ions of preferred energy and directionality in a manner so that during ion exposure, the source-to-substrate distance is maintained such that it is less than the mean-free path or diffusion length of the Ar atoms and ions at the vacuum pressure; and

d) allowing exposure of the polycrystalline p-CdTe side of the layer to said ion beam for a period less than about 5 minutes[.] prior to forming a contact interface or semiconductor layer.

Respectfully submitted,


Jerome J. Morris
Attorney for Applicant
Registration No. 24,696

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Facsimile: (202) 737-3315

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1919 PENNSYLVANIA AVE., NW, SUITE 200
WASHINGTON, DC 20006

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Continued Prosecution Appl on NREL
08/27/99

Jerome J. Laris

-48

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PTO/SB/29 (8/98)

Approved for use through 09/30/2000. OMB 0651-0032

Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.**CONTINUED PROSECUTION APPLICATION (CPA)
REQUEST TRANSMITTAL**Submit an original, and a duplicate for fee processing.
(Only for Continuation or Divisional applications under 37 C.F.R. § 1.53(d))

CHECK BOX, if applicable:

☒ DUPLICATE

Address to:

Assistant Commissioner for Patents
Box CPA
Washington, DC 20231Attorney Docket No.
of Prior Application

NREL / 96-48

First Named Inventor

T. Gessert

Examiner Name

S. Mulpuri

Group / Art Unit

1741

Express Mail Label No.

This is a request for a ☒ continuation or ☐ divisional application under 37 C.F.R. § 1.53(d),
(continued prosecution application (CPA)) of prior application number 08 / 937,721
filed on 09/25/97, entitled Ion-Beam Treatment To Prepare Surfaces of P-CdTe Films**NOTES**

FILING QUALIFICATIONS: The prior application identified above must be a nonprovisional application that is either: (1) complete as defined by 37 C.F.R. § 1.51(b), or (2) the national stage of an international application in compliance with 35 U.S.C. 371. A Notice will be placed on a patent issuing from a CPA, except for reissues and designs, to the effect that the patent issued on a CPA and is subject to the twenty-year patent term provisions of 35 U.S.C. § 154(a)(2). Therefore, the prior application of a CPA may have been filed before, on or after June 8, 1995.

C-I-P NOT PERMITTED: A continuation-in-part application cannot be filed as a CPA under 37 C.F.R. § 1.53(d), but must be filed under 37 C.F.R. § 1.53(b).

EXPRESS ABANDONMENT OF PRIOR APPLICATION: The filing of this CPA is a request to expressly abandon the prior application as of the filing date of the request for a CPA. 37 C.F.R. § 1.53(b) must be used to file a continuation, divisional, or continuation-in-part of an application that is not to be abandoned.

ACCESS TO PRIOR APPLICATION: The filing of this CPA will be construed to include a waiver of confidentiality by the applicant under 35 U.S.C. 122 to the extent that any member of the public who is entitled under the provisions of 37 C.F.R. § 1.14 to access to, copies of, or information concerning, the prior application may be given similar access to, copies of, or similar information concerning, the other application or applications in the file jacket.

35 U.S.C. 120 STATEMENT: In a CPA, no reference to the prior application is needed in the first sentence of the specification and none should be submitted. If a sentence referencing the prior application is submitted, it will not be entered. A request for a CPA is the specific reference required by 35 U.S.C. 120 and to every application assigned the application number identified in such request, 37 C.F.R. § 1.78(a).

1. ☒ Enter the unentered amendment previously filed on 08/23/99
under 37 C.F.R. § 1.116 in the prior nonprovisional application.
2. ☒ A preliminary amendment is enclosed.
3. This application is filed by fewer than all the inventors named in the prior application, 37 C.F.R. § 1.53 (d)(4).
 - a. ☐ DELETE the following inventor(s) named in the prior nonprovisional application:

 - b. ☐ The inventor(s) to be deleted are set forth on a separate sheet attached hereto.
4. ☐ A new power of attorney or authorization of agent (PTO/SB/81) is enclosed.
5. Information Disclosure Statement (IDS) is enclosed:
 - a. ☐ PTO-1449
 - b. ☐ Copies of IDS Citations

[Page 1 of 2]

Burden Hour Statement: This form is estimated to take 0.4 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box CPA, Washington, DC 20231.

CLAIMS	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
TOTAL CLAIMS (37 C.F.R. § 1.16(c) or (j))		5 -20* =	0	x \$ _____ =	\$ _____
INDEPENDENT CLAIMS (37 C.F.R. § 1.16(b) or (i))		1 -3** =	0	x \$ _____ =	\$ _____
MULTIPLE DEPENDENT CLAIMS (if applicable) (37 C.F.R. § 1.16(d))				+ \$ _____ =	\$ _____
				BASIC FEE (37 C.F.R. § 1.16)	\$385.00
				Total of above Calculations =	\$ _____
Reduction by 50% for filing by small entity (Note 37 C.F.R. §§ 1.9, 1.27 & 1.28).					
* Reissue claims in excess of 20 and over original patent. ** Reissue independent claims over original patent.					
TOTAL =					\$385.00

6. Small entity status:

- a. ☐ A small entity statement is enclosed, if (b) and (c) do not apply.
b. ☒ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
c. ☐ Is no longer claimed.

7. The Commissioner is hereby authorized to credit overpayments or charge the following fees to Deposit Account No. _____:

- a. ☐ Fees required under 37 C.F.R. § 1.16.
b. ☐ Fees required under 37 C.F.R. § 1.17.
c. ☐ Fees required under 37 C.F.R. § 1.18.

8. ☒ A check in the amount of \$ 385.00 is enclosed.

9. ☐ New Attorney Docket Number, if desired _____

[Prior application Attorney Docket Number will carryover to this CPA unless a new Attorney Docket Number has been provided herein.]

- 10 a. ☐ Receipt For Facsimile Transmitted CPA (PTO/SB/29A)
b. ☐ Return Receipt Postcard (Should be specifically itemized, See MPEP 503)

11. ☐ Other: _____

NOTE:

The prior application's correspondence address will carry over to this CPA UNLESS a new correspondence address is provided below.

12. NEW CORRESPONDENCE ADDRESS

<input type="checkbox"/> Customer Number or Bar Code Label		<input type="checkbox"/> New correspondence address below	
(Insert Customer No. or Attach bar code label here)			
Name			
Address			
City	State	Zip Code	
Country	Telephone	Fax	

13. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print/Type)	JEROME J. NORRIS
Signature	<i>Jerome J. Norris</i>
Registration No. (Attorney/Agent)	24,696
Date	October 29, 1999

(Continued Prosecution Application (CPA) Request Transmittal (PTO/SB/29)) [4-2.1]—page 2 of 2)

EXHIBIT V

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ARTY.'S DOCKET: NREL/96-48

Applicant: Timothy A. Gessert)
Serial No.: 08/937,721) Group Art: 1741
Filing Date: September 25, 1997) Examiner: S. Mulpuri
Title: ION-BEAM TREATMENT TO)
PREPARE SURFACES OF)
P-CdTe FILMS)



PRELIMINARY AMENDMENT

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

In advance of prosecution, and before this application is taken up for examination on the merits, please amend the application as follows:

IN THE CLAIMS

1. (Twice Amended) A dry process for making a low-resistance electrical contact between a metal and a layer of polycrystalline p-type CdTe surface by ion beam processing comprising:

a) placing a CdS/CdTe device having a polycrystalline p-type CdTe into a chamber and evacuating said chamber to create a vacuum;

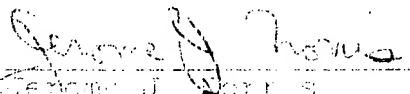
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Respectfully submitted,


Jerome J. Morris
Attorney for Applicant
Registration No. 24,696

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WASHINGTON, DC 20006

15-52/540

DATE 10/29/99

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Continued Prosecution Appl. on NREL

Jerome J. Morris

6-48

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 Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

CONTINUED PROSECUTION APPLICATION (CPA) REQUEST TRANSMITTAL

Submit an original, and a duplicate for fee processing.

(Only for Continuation or Divisional applications under 37 C.F.R. § 1.53(d))

CHECK BOX, if applicable:

☒ DUPLICATE

Address to:

Assistant Commissioner for Patents
Box CPA
Washington, DC 20231

Attorney Docket No.
of Prior Application

NREL / 96-48

First Named Inventor

T. Gessert

Examiner Name

S. Mulpuri

Group / Art Unit

1741

Express Mail Label No.

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[Page 1 of 2]

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MULTIPLE DEPENDENT CLAIMS (if applicable) (37 C.F.R. § 1.16(d))				+ \$ _____ =	\$ _____
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Reduction by 50% for filing by small entity (Note 37 C.F.R. §§ 1.9, 1.27 & 1.28).					
* Reissue claims in excess of 20 and over original patent. ** Reissue independent claims over original patent.				TOTAL =	\$385.00

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[Prior application Attorney Docket Number will carryover to this CPA unless a new Attorney Docket Number has been provided herein.]

- 10 a. ☐ Receipt For Facsimile Transmitted CPA (PTO/SB/29A)
b. ☐ Return Receipt Postcard (Should be specifically itemized, See MPEP 503)

11. ☐ Other: _____

NOTE:

The prior application's correspondence address will carry over to this CPA UNLESS a new correspondence address is provided below.

12. NEW CORRESPONDENCE ADDRESS

☐ Customer Number or Bar Code Label

(Insert Customer No. or Attach bar code label here)

or ☐ New correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Fax	

13. SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print/Type)	JEROME J. NORRIS
Signature	<i>Jerome J. Norris</i>
Registration No. (Attorney/Agent)	24,696
Date	October 29, 1999

(Continued Prosecution Application (CPA) Request Transmittal (PTO/SB/29)) [4-2.1]—page 2 of 2)

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